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Mali Solar Report

Prepared by J.v.G. Technology GmbH

J.v.G. Technology GmbH is a German engineering company specializing in turnkey solar module production lines and manufacturing consulting, with project experience ranging from 20 MW to 500 MW per production line, including multi-line and gigafactory projects exceeding this scale.

This Solar Report is part of the **PVKnowHow** Knowledge Network.
The data, analysis, and conclusions in this document are based on real research, consulting insights, and international solar market data.

Gain comprehensive insights into the statistics and metrics surrounding the solar production industry in Mali

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

Annual Sunshine Hours:
- Average: 2451 hours
- Minimum: 2110 hours
- Maximum: 2980 hours

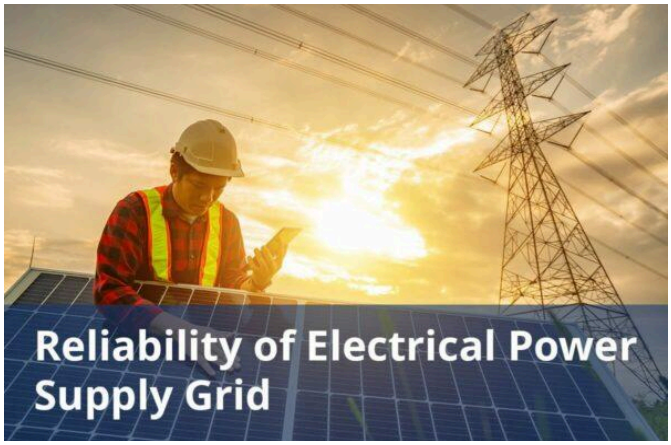
kWh per kWp installed

kWh per kWp:
- Average: 1150 kWh/kWp
- Maximum: 1300 kWh/kWp

Average cost per kWh from utility company

Average Cost of Electricity:

- Residential: $0.13/kWh
- Commercial: $0.11/kWh
- Industrial: $0.09/kWh



Reliability of electrical power supply grid

System Reliability:
- Uptime: 99.5%
- Downtime: 0.5%




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total Solar Panels Installed:

- As of 2023: 2 million panels
- Projected by 2025: 3 million panels

Total solar panel production capacity (projected)

Projected Solar Panels:
- 2025 Estimate: 3 million panels
- 2030 Estimate: 5 million panels

Average costs of various electricity generation sources (coal, natural gas, solar, etc)

Average Installation Costs:
- Residential: $2.50/watt
- Commercial: $2.00/watt
- Industrial: $1.50/watt

Percentages of various electricity generation sources (coal, natural gas, solar, etc)

Electricity Sources:
- Solar: 15%
- Wind: 25%
- Natural Gas: 30%
- Coal: 20%
- Hydro: 10%

Average daily availability of electricity from the national grid (measured in hours)

Daily Solar Availability:

- Average available sun: 5.5 hours
- Maximum recorded: 8 hours

Number of residential solar panel installations

Residential Solar Panels:
- Total: 1.5 million panels
- Growth rate: 10% per year

Total number of solar farms (installed and projected)

Solar Farms:
- Total number: 150 solar farms
- Average size: 5 MW

Off-grid market demand for solar panels (current and projected)

Current Demand:
- Mali saw a significant boost in off-grid solar sales, with 21364 units sold in the first half of 2021, according to GOGLA data.
- Additionally, Power Africa has facilitated 149848 off-grid connections in Mali, primarily solar lanterns, with a smaller portion being solar home systems.

Projected Demand:
- Mali's National Renewable Energy Action Plan aims to significantly boost off-grid renewables, targeting a thirtyfold increase in installed capacity from 20 MW in 2010 to 600 MW by 2030.

On-grid market demand for solar panels (current and projected)

Current Demand:
- As of 2023, Mali has an installed on-grid solar power capacity of approximately 97 megawatts (MW).

Projected Demand:
- Mali's on-grid solar PV market is expected to expand further, with a study by UEMOA identifying five sites, including Mali, for large-scale solar power plants totaling 574 MW, slated for completion by 2030.

Average monthly income of workers in solar industry (labor cost)

Mali's average monthly salaries span from $82 to $328 for lower-skilled workers, while higher-skilled professionals can earn upwards of $492, with notable differences based on factors like industry, education level, and work experience.

Population of the country

As of July 1, 2024, the population of Mali was approximately 24015789 people.

Average overhead costs of solar panel production (with a brief breakdown)

The overhead costs for solar panel production in Mali typically range from 20% to 25% of the total production cost.

Labor cost:
- Mali's minimum wage (SMIG) is $35, which is the base for full-time employees with formal contracts, excluding allowances.

- Additional occupational categories have higher monthly base salaries, including mandatory allowances, as follows:
- unskilled worker: 48.36 USD
- semi-skilled worker: 64.48 USD
- group leader: 96.72 USD
- foreman: 120.90 USD
- typist: 64.48 USD
- secretary: 112.84 USD
- accountant: 132.85 USD

Utilities:
- Running production lines consumes a substantial amount of energy, incurring costs of approximately $0.156/kWh.
- Electricity costs include a $24.18 annual premium and variable usage fees: peak hours (6pm-12am) at $0.13/kWh, busy hours (6am-6pm) at $0.084/kWh, and low hours (12am-6am) at $0.07/kWh.
- Water rates are $0.32/cubic meter for residential and $0.13/cubic meter for industrial use.

A summary of the energy infrastructure

Overview:
- Mali's electricity generation is primarily sourced from hydropower (55%) and diesel (45%), despite having significant solar and hydro potential.
- With a population of 18 million, the country's installed capacity is only 310MW, supplemented by 50MW imports from Cote d'Ivoire and 90MW off-grid production.

Generation:
- Mali's electricity generation is dominated by hydropower and thermal power stations, producing 500-600 GWh annually.

- The EDM-run national grid serves 35 towns, with hydropower accounting for 51% of installed capacity, despite being impacted by rainfall variability.

Some of the government regulations surrounding solar panel production

The National Policy for the Protection of the Environment:
- This policy prioritizes sustainable development and environmental protection for all Malians, providing a framework to address specific environmental concerns.
- Key objectives include promoting renewable energy use, particularly in rural areas, enhancing human capacity, and combating desertification.

Mali's National Energy Policy: Renewable energy objectives and measures:
- Mali's policy seeks to expand renewable energy adoption, targeting a 10% share of electricity generation by 2015, up from less than 1% in 2004.
- Key initiatives include:
- Assessing and developing renewable energy resources
- Promoting solar energy in rural areas
- Supporting local content and manufacturing
- Advancing research in emerging renewable energy technologies.

Government initiatives in solar panel production (includes investments and subsidies)

Tax Exemptions for Solar Products:
- Mali's Law n2020-01216, enacted in 2020, grants tax and import duty exemptions for solar products and other renewable energy equipment.

Independent Power Producer (IPP) Solar Project:
- The Malian government has awarded a 30-year concession to an independent power producer (IPP) for a 50 MWp solar power plant, a project initially agreed upon in 2016, with an investment of approximately $101 million.

World Bank's Yelen Sira Project:
- The World Bank has allocated $157 million in funding to support Mali's efforts to enhance its electricity infrastructure and improve the overall power system.

Notable solar projects in the country (installed and projected)

KITA SOLAR PLANT:
- Location: Approximately 180 km west of Bamako, in Mali's Kayes Region
- Installed Power: 50 MWp
- Technology: Ground mounted photovoltaic panels and Agri voltaism
- Status: In Operation since March 2020

SANANKOROBA SOLAR PLANT:
- Location: southwestern part of Mali
- Installed Power: 200 MW
- Technology: photovoltaic
- Status: Pre-construction

SEGOU SOLAR FARM:
- Location: Pélengana, Ségou Cercle, Ségou Region, Mali
- Installed Power: 33 MWp/dc
- Technology: photovoltaic
- Status: Pre-construction

SAFO SOLAR POWER PLANT:
- Location: Koulikoro region
- Installed Power: 100 MWp
- Technology: photovoltaic
- Status: on-going

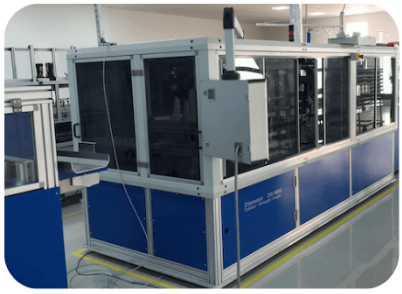
FANA SOLAR FARM:
- Location: Bamako, Dioïla circle, Koulikoro Region, Mali
- Name plate capacity: 50 MWp/dc
- Technology: photovoltaic
- Status: Shelved (inferred August 2023)

Some of the notable solar companies (plus brief details on what they do)

Legendre Energie:
- NEXHOS ENERGIES, previously known as Legendre Energie, provides a comprehensive suite of services for property owners to decarbonize their assets, including:
- Development and installation of photovoltaic solar power plants (ARMORGREEN)
- Operation and maintenance of power plants (ENER24)
- Investment solutions (GREENERGIE)

Scatec solar:
- Scatec's integrated business model covers the development, construction, ownership, and operation of renewable energy plants in emerging markets.

Nova wind:
- NovaWind, part of Russia's Rosatom, is a pioneer in renewable energy solutions, offering a comprehensive range of services.



ABOUT THIS REPORT

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All market data, analysis, and conclusions follow JvG's internal consulting standards and international PV market research practices.

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About J.v.G. Technology GmbH

J.v.G. Technology GmbH is a European engineering and advisory specialist for solar production lines and manufacturing equipment, supporting investors and operators with market, location and production-focused decision frameworks.
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